CMPT 135-D100 Mini Midterm
Spring 2023

This is a **20 minute closed book exam**: notes, books, computers, calculators, electronic devices, etc. are **not** permitted. Do not speak to any other students during their exam or look at their work. Please remain seated and **raise your hand** if you have a question.

Pointers and Memory Management

In this question, `pv` is a variable of type `vector<string*>*`. The vector was allocated on the free store using `new`, and the pointers in it point to different strings that were allocated on the free store using `new`. There are no null pointers.

a) (2 marks) Draw a diagram that shows what the pointers and vectors looks like in memory. Assume it has 3 strings, “a”, “b”, and “c”. Assume `pv` is on the call stack.

b) (2 marks) Write a C++ loop that prints to cout each string pointed to by `pv`.

c) (2 marks) Write a fragment of C++ code that properly de-allocates the vector `p` points to, and also all the strings pointed to by it. There should be no memory leaks or other errors.

Object-oriented Programming and Inheritance

(5 marks) Create a class called `Circle` that stores the center and radius of a circle. Make these private, and call them `x`, `y`, and `radius`. In addition, add the following:

1. A **default constructor** that sets both `x` and `y` to 0, and the `radius` to 100.
2. A **copy constructor** that uses an **initialization list** to make a new `Circle` object that is a copy of a another `Circle` object.
3. A **destructor** that prints "done!".
4. A **setter** that lets the user change the `radius` of the circle. If a user tries to set `radius` to a value that is 0 or less, then the `radius` is *not* changed.

Multiple Choice

For each of the following questions, fill in **the one best answer** on the answer sheet.

Every correct answer is worth 1 mark. Incorrect answers, unanswered questions, questions with more than one answer, or questions with illegible answers, are worth 0.

1) Who is the original designer of C++?

A. Bjarne Stroustrup
B. Dennis Ritchie
C. Guido van Rossum
D. James Gosling

2) Consider these two statements:

i) Blackbox tests can be created *without* seeing the implementation of a function.
ii) Whitebox tests can be created *without* seeing the implementation of a function.

Which one of these statements most accurately describes the truth values of i) and ii)?

A. i) and ii) are both true
B. i) and ii) are both false
C. i) is false and ii) is true
D. i) is true and ii) is false

3) Consider these two statements about the code fragment in the box:

```
int n = 1;
???;
cout << n;
```

i) If `???` is replaced by `++n` then the fragment prints 2.
ii) If `???` is replaced by `n++` then the fragment prints 2.

Which one of these statements most accurately describes the truth values of i) and ii)?

A. i) and ii) are both true
B. i) and ii) are both false
C. i) is false and ii) is true
D. i) is true and ii) is false